

The Impact of the Montgomery County Smoke Free Ordinance on Restaurant Sales and Employment

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Summary of Findings
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- On October 9, 2003 all Montgomery County workplaces, including restaurants and bars, were required to become smoke-free. The incorporated jurisdictions within the county had the option of passing their own city smoke-free ordinance or continuing to allow smoking. The cities of Takoma Park, Rockville and Gaithersburg passed their own local ordinances. The implementation date for the large population center of Rockville was February 1, 2004 and Gaithersburg followed suit on March 22, 2004.
- The purpose of this report is to examine whether the Montgomery County smoke free ordinance altered restaurant employment and taxable sales. We compare outcomes in Montgomery County before and after the law went into effect with the same outcomes in similarly defined control counties.
- We use two sets of control counties: nearby counties in Maryland and Fairfax County, Virginia.
- Tax data for Maryland counties is available monthly by industry and county from November 2001 through July 2005, which was obtained from the state Comptroller's office.
- We also use data on counts of employees that pay state Unemployment Insurance by month, industry type, and county from January 2001 through December 2004.
- Results show that compared to the control counties, the smoke-free ordinance had no impact on restaurant tax revenue in Montgomery County after the law went into effect. These results are true regardless of whether the restaurant had a liquor license or not.
- Results also show that the law had no impact on employment in all restaurants when compared to secular changes in employment in either Maryland counties or Fairfax County, Virginia. Interestingly, employment tended to increase in restaurants with liquor licenses, while it decreased in restaurants without liquor licenses with no net overall change. One possible explanation is that patronage patterns shifted slightly toward establishments that served liquor but were now required to be smoke-free.
- Tax revenue and employment data indicate in contrast to predictions of some, the Montgomery County smoke-free ordinance did not adversely impact the hospitality industry.

Background

On October 9, 2003, all Montgomery County workplaces, including restaurants and bars, were required to become smoke-free. The incorporated jurisdictions within the county had the option of passing their own city smoke-free ordinance or continuing to allow smoking. The cities of Takoma Park, Rockville and Gaithersburg passed their own local ordinances. The implementation date for the large population center of Rockville was February 1, 2004 and Gaithersburg followed suit on March 22, 2004.

Opponents of the regulations claimed that people wouldn't support the law, that compliance would be difficult, and that it would cause large drops in business for the restaurant and particularly the bar industries.

Proponents of the regulations claimed that the smoke-free law would reduce exposure to secondhand smoke, improve worker health, and not cause adverse economic outcomes to the hospitality industry

The purpose of this report is to examine whether the Montgomery County smoke free ordinance altered restaurant employment and taxable sales. We compare outcomes in Montgomery County before and after the law went into effect with the same outcomes in similarly defined control counties.

Results show no significant changes in restaurant tax revenue in Montgomery County after the smoke-free law compared with other comparable Maryland counties regardless of whether the restaurant had a liquor license or not. Results also show that the law had no impact on employment in all restaurants when compared to either secular changes in employment in Maryland counties or there was no changes in employment for all restaurants was observed when comparing to other similar Maryland counties or neighboring Fairfax County in Virginia.

Research design

Our basic research strategy is to compare the time series in restaurant taxable sales and employment in Montgomery County before and after the implementation of the law to a set of comparison counties that have similar trends but were not impacted by the legislation. The comparison counties are used to identify the underlying trends in the impacted industries that would have occurred in the absence of the law. If the smoke-free restaurant ordinance negatively impacted restaurants, then we should see a large decline in tax revenues and employment in Montgomery County establishments after the law went into effect, relative to the comparison group.

Not all restaurants should be impacted by the smoke-free ordinance. Many restaurants such as fast food establishments belong to national chains that have already banned smoking in their restaurants. As a result, we will look at three different groups of restaurants: Full service restaurants with liquor licenses, limited service (mostly fast food) restaurants, and all restaurants combined.

In our work, we use a number of different comparison groups. First, we use data from five other counties that are part of large metropolitan statistical areas, namely, Frederick County, Howard County, Prince George's County, Baltimore County and Baltimore City. Data on employee counts is available for counties in other states so for that data set, we also use data from Fairfax County, Virginia as a comparison group.

Data

We use data from two sources. The first is monthly tax revenues by county and industry from November 2001 through July 2005. The data was provided to us from the state Comptroller's office. Reporting establishments are classified into particular industries and there are three that are relevant for this analysis.

Industry Code	Industry Definition
108	Restaurants, lunchrooms, delicatessens without beer, wine, liquor license
111	Hotel/motels selling food, with a beer, wine, liquor license
112	Restaurants and night clubs, with a beer, wine, liquor license

We combine data from industries 111 and 112 and define this group as full service restaurants that are most likely to be impacted by the law. Restaurants in group 108 include many fast food restaurants so these are the limited service restaurants that are less likely to be impacted by the Montgomery smoke-free ordinance.

The second source of data is counts of employees that pay state Unemployment Insurance. This data is available by month, by county, and by industry from January 2001 through December 2004. The data is available for download from the Bureau of Labor Statistic's web site, www.bls.gov and the information is reported by detailed NAICS industry code. Reporting establishments are classified into particular industries and there are three that are relevant for this analysis.

NAICS 7221	Full service restaurants
NAICS 7222	Limited service restaurants
NAICS 7224	Drinking establishments (Alcoholic beverages)

Complete definitions of these three NAICS industry classifications are listed in Appendix Table 1. To match the groupings we use for the analysis of sales tax revenue data, NAICS 7221 and 7224 are considered full service restaurants that are most likely impacted by the law. We should note that the vast majority of the employment in this group is from NAICS 7221 with this group of restaurants representing about 96 percent of employment in these two industries. NAICS 7222 are limited service restaurants (e.g., fast food restaurants) that were hypothesized to be less likely to be impacted by the law because many already have smoke-free policies.

Graphical Presentation: Sales Tax Revenue Data

In Figure 1, we graph real sales tax revenue for full-service restaurants and bars with alcohol licenses in Montgomery County verses data aggregated from the five comparison counties. We use the Consumer Price Index All Urban Consumers index to deflate dollars into real July 2005 values. Because Montgomery County has only a fraction of the restaurant sales as the control counties aggregated together, we divide each monthly observation by the sample mean for the group. The time series are then centered on one and a value of 1.1 would mean that the monthly value is 10% above sample average for the group. In all graphs, the solid line with diamond markers presents the time series for control counties while the solid line without any markers is the data for Montgomery County. All lines to the right of the solid vertical line in the graph are dates when the smoke-free ordinance was in effect (October 2003 and

on).

Notice first that the time series of sales tax revenues prior to October 2003 in the comparison group tracks well revenues in Montgomery County, indicating that we have a good comparison group. Notice also that after the passage of the law, sales in both Montgomery and the comparison counties increase by the nearly the same amount. If the smoke free ordinance reduces sales, we should see a fall in tax revenues in Montgomery County relative to what is happening in the comparison group. The numbers in the graph clearly illustrates that the law had little if any impact on taxable restaurant sales in Montgomery County.

The law should have little impact on tax revenues in limited-service restaurants without a liquor license since a large fraction of these establishments are part of national chains that have already banned smoking in their restaurants. In Figure 2, we conduct a similar analysis for eating establishments without a liquor license and we find that there is no difference in post-ban sales between Montgomery County and the comparison group.

In Figure 3, we aggregate data together for all restaurants and we find again, the two series track each other well, both before and after the restaurant smoking ban went into effect. Again, there is little evidence that the smoking ban in restaurants hurt restaurant revenues in Montgomery County.

Graphical Presentation: Employment Data

In Figure 4, we graph monthly employment for NAICS 7221 and 7224 (full service restaurants and drinking establishments) in Montgomery County versus the five comparison counties from Maryland. As in the previous figures, the aggregate data from the comparison groups has a much higher monthly value than the number for Montgomery County so we scale each series by its sample mean so the mean of the time series is centered on one.

As with the graphs for taxable sales data, the time series of employment for the five comparison counties tracks well the events in Montgomery County through September 2003, indicating these counties are an appropriate comparison group. Interestingly, after the smoke-free restaurant law went into effect, employment growth in restaurants and bars in Montgomery County is actually faster than growth in the comparison group, but the difference is small, on the order of a few percentage points.

In contrast to the results for the tax revenues data, Figure 5 shows that employment in limited eating establishments (NAICS 7222) falls after the passage of the smoke-free restaurant ordinance instituted, but the drop is again small. Adding employment data for NAICS 7221, 7222 and 7224 together, we show that for all restaurants, there is no difference in the two time series before or after the smoke-free ordinance is passed (see Figure 6).

The results of the exercise above are dependent on having an accurate comparison sample. The close mapping of outcomes before October 2003 in all graphs suggests this is indeed the case. However, to examine the sensitivity of our model to the selection of the comparison group, we can reproduce Figures 4-6 using a second comparison group: Fairfax County Virginia.

In Figures 7-9, we reproduce the results from the three previous figures using data from Fairfax County as the comparison group. For the full service restaurant/bar subsample (NAICS 7221 and 7224), the two time series show nearly identical movements in the pretreatment period. After October 2003, there is virtually no difference in the two series, again, indicating the Montgomery County smoke free restaurant

ban had little impact on bar and restaurant employment. Like the graph using other Maryland counties as controls, employment in limited service eating places was slightly higher in Fairfax County than in Montgomery County after the law took effect (Figure 8). As we aggregate data for all restaurants (Figure 9), there is virtually no difference in the growth in employment Montgomery County, relative to Fairfax, after the passage of the smoke-free ordinance in Montgomery County.

Econometric Estimates

In this section, we use the monthly data introduced in the previous section to estimate a more detailed statistical model that calculates the economic impact of the Montgomery County smoke-free ordinance on restaurant tax sales and employment. The model we estimate is a simple difference-in-difference specification where we statistically compare the time series in outcomes in Montgomery County before and after passage of the smoke-free law to the same outcomes in control counties. The control counties are used as a comparison to establish what the time path of outcomes in Montgomery County would have been in the absence of the intervention. For example, suppose that one year after the smoke-free ordinance went into effect that tax sales rose by 10 percent. This information provides us with no knowledge of the impact of the smoke free ordinance since we have no idea what sales would have been in the absence of the intervention. If sales tax revenues would have risen by 10 percent anyway, then the law has no impact. If on the other hand tax revenues would have increased by only 5 percent in the absence of the law, then the 10 percent growth in revenues indicates the law actually spurred economic activity. The use of comparison counties provide a way to calculating this counterfactual since these counties are not subject to the same legislative action.

In this model, let Y_{it} be the outcome of interest for county i in month t . The outcomes are either measures of tax revenue collected or total employees. To facilitate analysis of coefficients, we take the natural log of all continuous variables. The basic difference in difference model is described by the equation:

$$Y_{it} = X_{it}\beta + \text{SMOKEFREE}_{it}\alpha + u_i + v_t + \varepsilon_{it}$$

In this model, the variable X captures aggregate economic activity in the county. In the tax revenue models, X is measured as the log of real tax revenues for general merchandise. In the employment count models, we use total non-restaurant employment in the county. We control for persistent differences in the level of the outcome across counties by adding a series of county-specific fixed-effects (u_i) to the model. Likewise, there is cyclic variation in restaurant business throughout the year and secular changes in business throughout the time period of analysis, so we include a set of year-specific quarterly dummy variables (v_t). These capture changes in the outcome that are common to all counties but differ over time. The key variable in the analysis is SMOKEFREE which a dummy variable that equals 1 for Montgomery County in months the smoke free ordinance is in effect. Because the dependent variable is measured in natural logs, the coefficient α on SMOKEFREE represents the percentage change in the outcome attributable to the Montgomery smoke-free ordinance. All dollar values are translated all real July 2005 dollars using the Consumer Price Index, All Urban Consumers series.

In Table 1, we report estimates for equation (1) using data on monthly real tax revenues in the restaurant sector. We estimate three models, one for restaurants with liquor licenses, one for those without, and one for all restaurants. As with the previous graphical and numeric presentations, for control counties, we use data from Frederick, Howard, Prince George, Baltimore county and Baltimore city. The dependent variable is real tax revenues per month for each sector. We report only the coefficient on the SMOKEFREE variable and the log of real general merchandise tax revenues.

The regression models with tax revenue data fit well with R^2 's in excess of 0.98 in each case. In restaurants with a liquor license, a 10 percent increase in real tax revenues generates about a 17 percent increase in restaurant revenues. Note that the coefficient on the SMOKEFREE variable is a small and statistically insignificant 0.014, indicating that after the passage of the Montgomery smoke-free ordinance; taxable restaurant sales increased by 1.4 percent relative to the control counties. However, we cannot reject the null hypothesis that there was no impact of the law on taxable revenues in this sector. As expected, there is virtually no impact of the ordinance on tax revenues in restaurants without liquor licenses and there is a statistically insignificant decline in tax revenues of -0.3 percent in all restaurants.

In Table 2, we report estimates for equation (1) using data on log counts of employees in the restaurant sector as the outcome of interest. In this case, we use the five Maryland counties as controls. The model fits incredibly well with all R^2 's in excess of 0.99. Restaurant employment is highly correlated with overall non-restaurant employment in the county. Interestingly, after enforcement of the smoke-free ordinance in Montgomery County, employment in the county in full service restaurants increased relative to the controls by a statistically significant 7.4 percent. At the same time, employment in limited service (e.g. fast food) restaurants declined by a statistically significant 8.0 percent, generating a net estimated increase in total restaurant employment of 0.5 percent. This final result is however statistically insignificant. Overall, in these models, we cannot reject the null hypothesis that the Montgomery County smoke-free ordinance had no impact on overall restaurant employment.

In Table 3, we re-estimate models from Table 2 but use Fairfax County Virginia as the sole control county. The results from these models are nearly identical to the estimates from Table 2. After enforcement of the smoke-free ordinance in Montgomery County, employment in the county in full service restaurants increases relative to the controls by 3.8 percent, but at the same time, employment in limited service (e.g. fast food) restaurants declines by 5.2 percent, generate a net decrease in total restaurant employment of 0.5 percent. This number is however statistically insignificant and we cannot reject the null hypothesis that the Montgomery County smoke-free ordinance had no impact on restaurant employment.

Conclusion

Results from this analysis demonstrate that the Montgomery County smoke-free ordinance had little if any impact on taxable sales or employment in the hospitality business within the county. Our results indicate that the growth in restaurant tax revenue in Montgomery County were virtually identical to growth in revenues in other urban counties in Maryland that were not impacted by the law. Interestingly, employment in full service restaurants and bars increased slightly in Montgomery County relative to controls, while employment decreased slightly in restaurants without liquor licenses. One possible explanation for this result is that patronage patterns shifted toward establishments that served liquor but were now required to be smoke-free.

After examining objective tax and employment data, the fears of the Montgomery County hospitality industry suffering economic hardship due to the smoke-free law have not been realized.

Acknowledgement

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Table 1
 OLS Estimates of Log(Restaurant Tax Revenue) Equation,
 Monthly Data, November 2001 through July 2005,
 Frederick, Howard, Prince George's, Baltimore County and Baltimore City as Controls

Coefficient (Standard Error)

Covariate	Restaurants, night clubs and hotels restaurants w/ BWL	Restaurants, luncheons, and delicatessens w/out BWL	All restaurants
log(general merchandise tax revenues)	0.166 (0.021)	0.320 (0.021)	0.243 (0.016)
Montgomery County, 11/03 and after	0.0144 (0.0273)	-0.0076 (0.0271)	-0.0027 (0.0209)
R ²	0.983	0.982	0.989
Observation	270	270	270

All models include dummy variables for each county, plus dummy variables for each quarter in the sample (e.g., 1st quarter 2002, 2nd quarter 2002, etc.).

Table 2
 OLS Estimates of Log(Monthly Restaurant Employment) Equation,
 Monthly Data, January 2001 through December 2004
 Frederick, Howard, Prince George's, Baltimore County and Baltimore City as Controls

	Coefficient (Standard Error)		
Covariate	Full service restaurants and bars NAICS 7221 and 7224	Limited service restaurants NAICS 7222	All restaurants NAICS 7221, 7222, 7224
log(Total non-restaurant employment)	1.412 (0.085)	0.727 (0.098)	1.046 (0.066)
Montgomery County, 11/03 and after	0.074 (0.014)	-0.079 (0.013)	0.005 (0.009)
R ²	0.995	0.996	0.997
Observation	288	288	288

All models include dummy variables for each county, plus dummy variables for each quarter in the sample (e.g., 1st quarter 2002, 2nd quarter 2002, etc.).

Table 3
 OLS Estimates of Log(Restaurant Employment) Equation,
 Monthly Data, January 2001 through December 2004,
 Fairfax County Virginia as a Control

Coefficient (Standard Error)			
	Full service restaurants and bars	Limited service restaurants	All restaurants
Covariate	NAICS 7221 and 7224	NAICS 7222	NAICS 7221, 7222, 7224
log(Total non-restaurant employment)	0.812 (0.160)	0.812 (0.160)	0.783 (0.116)
Montgomery County, 11/03 and after	0.038 (0.009)	-0.052 (0.008)	-0.005 (0.007)
R ²	96	96	96
Observation	0.993	0.890	0.991

All models include dummy variables for each county, plus dummy variables for each quarter in the sample (e.g., 1st quarter 2002, 2nd quarter 2002, etc.).

Appendix Table 1
 NIACS Definitions

NAICS code	Short description	Definition
7221	Full service restaurants	This industry group comprises establishments primarily engaged in providing food services to patrons who order and are served while seated (i.e., waiter/waitress service) and pay after eating. Establishments that provide these types of food services to patrons with any combination of other services, such as takeout services, are classified in this industry.
7222	Limited service eating places	This industry group comprises establishments primarily engaged in providing food services where patrons generally order or select items and pay before eating. Most establishments do not have waiter/waitress service, but some provide limited service, such as cooking to order (i.e., per special request), bringing food to seated customers, or providing off-site delivery.
7224	Drinking Establishments (Alcoholic Beverages)	This industry group comprises establishments primarily engaged in preparing and serving alcoholic beverages for immediate consumption.

Figure 1: Scaled Real Monthly Tax Revenues,
Restaurants w/ Liquor Licenses

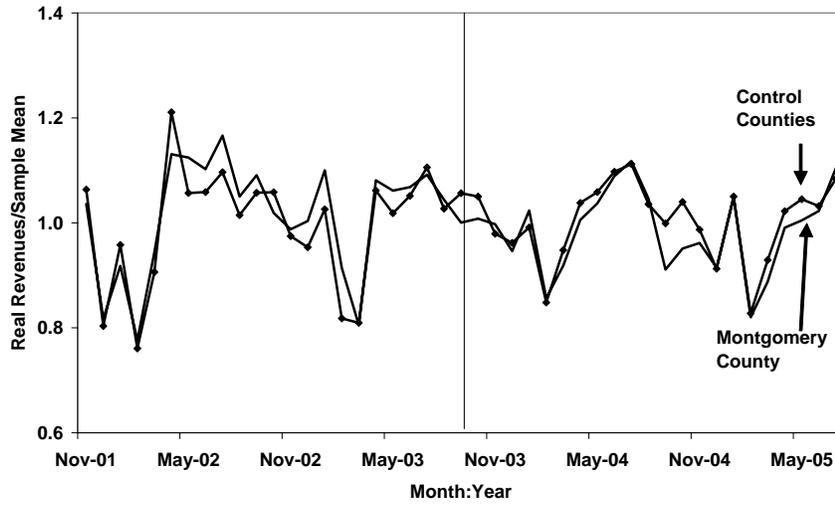


Figure 2: Scaled Real Monthly Tax Revenues,
Restaurants w/out Liquor Licenses

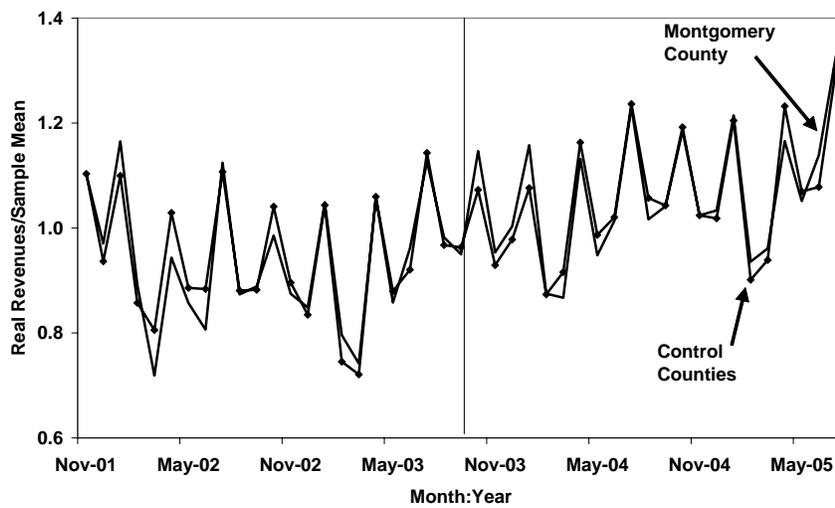


Figure 3: Scaled Real Monthly Tax Revenues,
All Restaurants

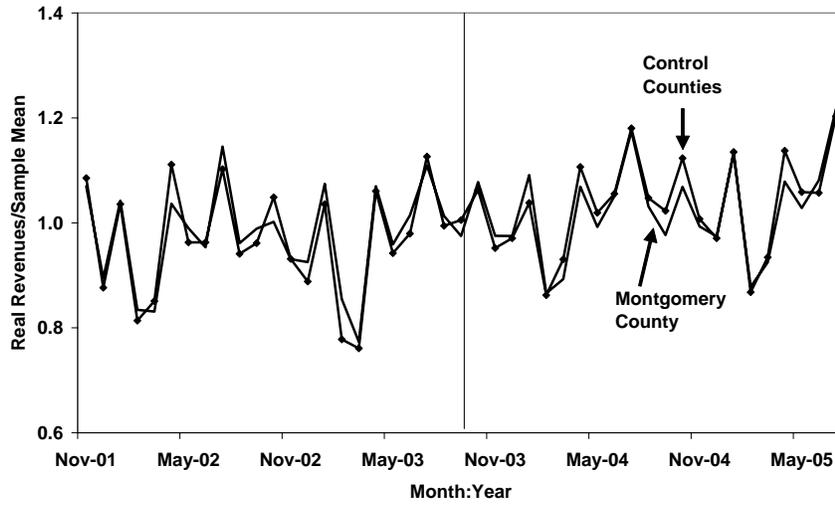


Figure 4: Scaled Monthly Employment, NAICS 7221+7224
Restaurants/Bars w/ Liquor License

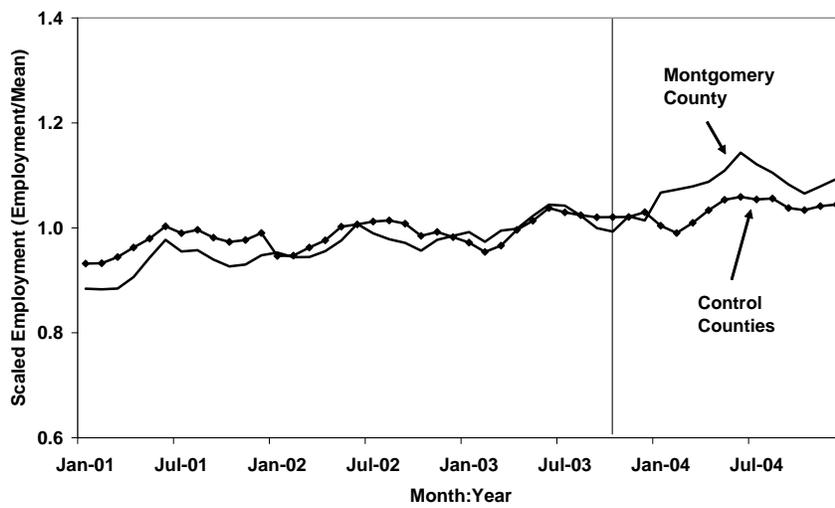


Figure 5: Scaled Monthly Employment, NAICS 7222,
Limited Service Eating Places

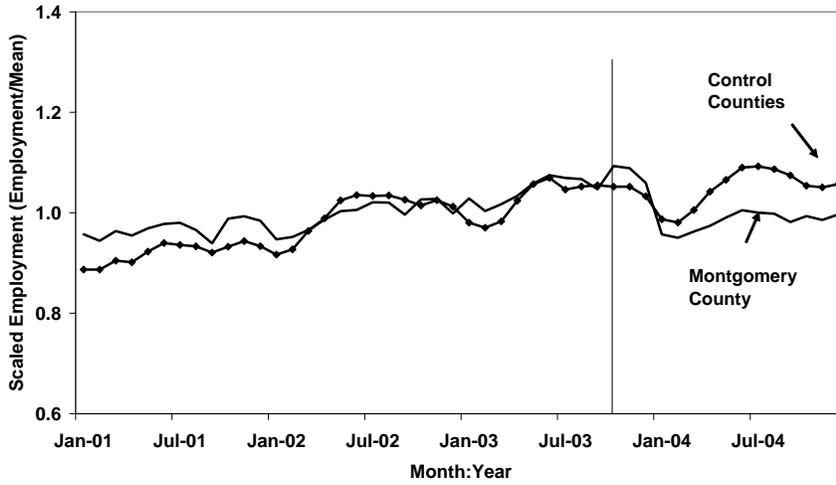


Figure 6: Scaled Monthly Employment, NAICS 7221, 7222, 7224
All Restaurants/Bars

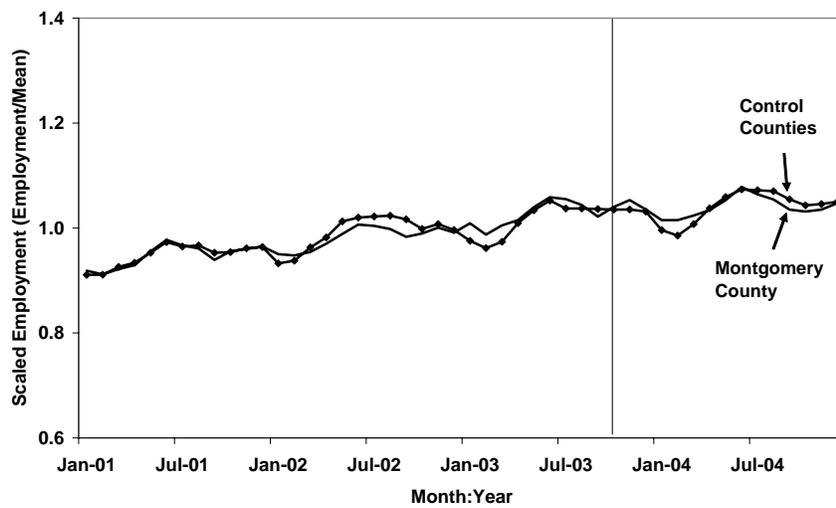


Figure 7: Scaled Monthly Employment, NAICS 7221+7224
Restaurants/Bars with Liquor License

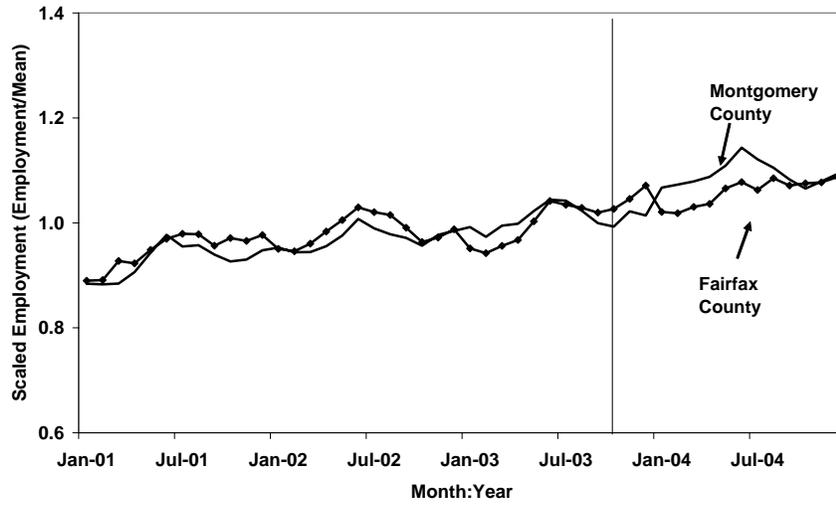


Figure 8: Scaled Monthly Employment, NAICS 7222
Limited Service Eating Places

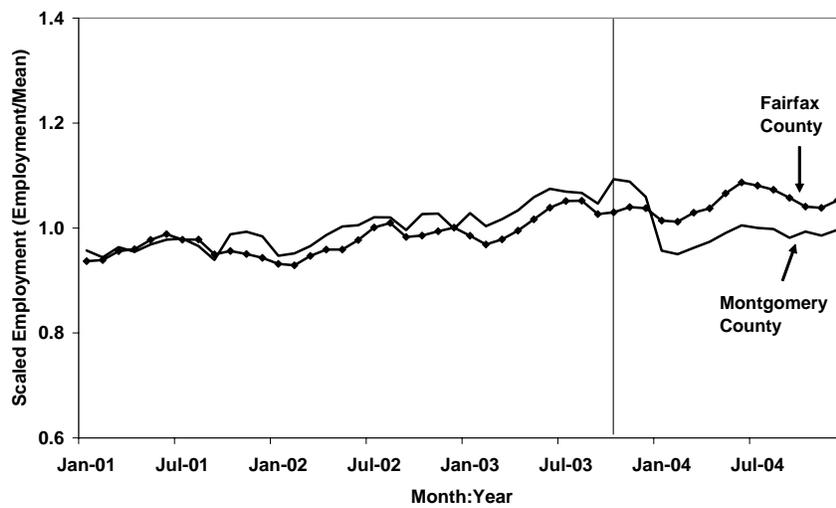


Figure 9: Scaled Monthly Employment, NAICS 7221, 7222, 7224
All Restaurants

